REMARKS

Claims 1, 22 and 27 have been amended. Claims 1-4, 6-13, 15, 22-27, 29-31 and 49-57 are currently pending in the present application.

I. **Amendments**:

Claim 1 has been amended to recite that the cationic organic polymer is prepared from a monomer mixture consisting essentially of from 2 to 50 mole% cationic monomer having an aromatic group and from 98 to 50 mole% (meth)acrylamide. Support for this amendment can be found in the specification at page 7, lines 6-15. As such, no new matter has been added.

Claims 22 and 27 have been amended to be consistent with amended claim 1. Again, no new matter has been added.

II. **The Invention**:

The present invention relates to a papermaking process in which drainage and retention aids are used as additives to a cellulosic suspension, as defined in claims 1, 22 and 27. The invention provides improved drainage (dewatering) and retention when producing paper from an aqueous cellulosic suspension having a high conductivity.

III. **Rejections**:

On pages 2-3, section 4 of the Office Action, claims 1-4, 6-13, 15, 21-27, 29-31 and 49-57 were rejected under 35 U.S.C. 103(a) as being unpatentable over Langley et al. (US Patent No. 4,753,710), in view of Ogawa et al. (JP 63-92800), further evidenced by Satterfield et al. (U.S. Patent No. 5,755,930) or Blanco et al. in "Predicting the impart of closing the water system in paper mills". This rejection is respectfully traversed.

Langley et al. disclose a process for making paper or paper board in which a cationic organic polymer and an anionic inorganic material are added to an aqueous cellulosic suspension. Applicants submit that Langley et al. do not teach or suggest the polymers as presently claimed. This is also noted in the Office Action on page 3, which states that "Langley et al. … do not teach the polymers as claimed."

Moreover, Applicants respectfully submit that Langley et al. teach away from the presently claimed invention. In that regard, Langley et al. disclose polymers made by polymerizing monomers that consist of or include cationic monomers and present a long list of suitable cationic monomers, which are all different from the polymers as presently claimed. (See Langley et al. at col. 8, lines 50-60). Thus, it is submitted that Langley et al. teach away from the presently claimed invention.

Ogawa et al. disclose a paper strength reinforcing agent having as an effective component a water-soluble copolymer comprising the structural monomer components (a) from 0.5 to 10 mole% of monomer represented by the general formula (I) as indicated at page 2 of Ogawa et al., (b) from 0.2 to 5 mole% of α,β-unsaturated monocarboxylic acid and/or α,β-unsaturated monocarboxylic acid monomer or a salt thereof, and (c)) from 85 to 99.3 mole% acrylamide and/or methacrylamide monomer.

Applicants respectfully submit that Ogawa et al. teach away from the presently claimed invention. In that regard, Ogawa et al. teach, at the paragraph bridging pages 6 and 7, that:

> "The amount of the α,β-unsaturated monocarboxylic acid is preferably from 0.2 to 5 mol%, and **less than 0.2 mol% is insufficient** for the formation of ionic bonds and with more than 5 mol% there is a trend towards an adverse effect on the dispersion of the pulp, and especially fine fibre-like pulp, and the yield, and this is undesirable" (emphasis added).

Applicants submit that, from the above, it is clear that Ogawa et al. teach that the α,β-unsaturated monocarboxylic acid is a necessary component in the monomer mixture. As such, it is submitted that Ogawa et al. teach away from the present claims.

Moreover, Applicants are unaware of any disclosure, teaching or suggestion by Ogawa et al. regarding the use of an anionic microparticulate material.

Satterfield et al. disclose a process for making filled paper comprising blending filler with a cationising amount of cationic polymer which provides improved retention of filler for “dirty” suspensions, and further discloses that prolonged recycling of white water may contribute to the suspensions being “dirty.” Satterfield et al. teach that the “dirty” suspension can be such that the white water has conductivity above about 1,000, and preferably above about 1,500 micro Siemens, often 2,000 to 3,000 micro Siemens. Satterfield et al. disclose a wide variety of cationic polymers (See col. 6, line 3 to col. 7, line 25), but fail to disclose, teach or suggest the cationic polymer as presently claimed. In fact, Applicants are unaware of any teaching or suggestion by Satterfield et al. with regard to using a cationic organic polymer having an aromatic group.

Blanco et al. discuss various aspects of closing the water system in paper mills and paper making processes. However, Blanco et al. do not address improvements in drainage and retention, and do not disclose, teach or suggest the cationic polymer or the anionic microparticulate material as claimed according to the present application.

Although Blanco et al. disclose in Table I on page 436 that “typical” compositions of white water have conductivities in the range of 3-11 mS/cm, Blanco et al. are silent as to the source of the data, including the number of mills sampled and the reason for the high conductivity. Moreover, on page 437 under “Inorganic ions,” Blanco states that the normal range of conductivities is 500 to 10,000 µS/cm, i.e. 0.5-10 mS/cm. Thus, it is respectfully submitted that the reason for the high conductivities in the white water is likely from high levels of inorganic ions present at the sampled mills. Moreover, Blanco is completely silent with regard to using a cationic organic polymer having an aromatic group.

Regarding the teachings of Blanco, the European Opposition Division, in the European Opposition proceeding for corresponding European patent EP-B-1080272,

found it reasonable to assume that the high conductivities (disclosed by Blanco (ref. D10' in the Opposition)) originates from extremely high levels of ionic impurities, e.g. Ca^{2+}, and stated that it is well known that such water sources can be found, for example, on the Iberian peninsula. See Decision from Opposition Division at pages 6-7 (Ex. A to Amendment previously filed on August 3, 2006). The Decision ultimately rejected the opposition finding that none of the cited references suggest the application on high conductivity suspensions of aromatic group containing polymers.

The European Opposition Division's analysis of Blanco is further supported by the declaration of John Nicholass, which was submitted in the European opposition proceeding (See Ex. B to Amendment filed on August 3, 2006). In his declaration, Mr. Nicholass provides information about conductivity data from 1998 to 1999 that has been compiled from 188 commercial paper and board making applications using white water recirculation, in different countries and regions throughout the world. A review of the data reveals that the applications in the Iberia region tend to have high conductivities. Further, the data shows that the vast majority of applications using white water recirculation have conductivities under 2.4 mS/cm.

This is also supported by the declaration of Hans Hallstrom, which was previously filed on February 5, 2003, in response to the Office Action dated September 5, 2002, and which provided conductivity data from 20 European, North American and Japanese paper machines commercially producing paper from processes that included white water recirculation. The data shows that the majority (or approx. 80%) of the mills were commercially producing paper from cellulosic suspensions having conductivity levels in range of 500-1800 µS/cm. Therefore, Applicants respectfully submit that the prior art, when read as a whole (including Satterfield and Blanco), teaches one skilled in the art that, although a paper making process that includes white water recirculation may include a suspension having conductivity in the claimed range, the vast majority of such processes will include suspensions having a conductivity out side of the claimed range.

Further, as discussed above, none of the cited references, i.e., Langley et al., Ogawa et al., Satterfield et al. or Blanco et al., disclose or suggest the cationic polymers claimed in the present invention.

It is the invention as a whole, and not some part of it, which must be obvious to support a rejection under 35 USC §103(a). *In re Antonie*, 195 USPQ 6, 8 (CCPA 1977). The unsuggested recognition of a relationship between the result produced and the particular design parameters is the touchstone of nonobviousness. A process is unobvious in cases where optimizing a known result-effective variable produces unexpectedly good results or where the art did not recognize that the parameter optimized was a result-effective variable. *Id.* at 8-9.

In the instant case, optimizing the conductivity within the range of 2.4-10.0 mS/cm in connection with drainage and retention aids that include anionic microparticulate material and a cationic polymer (containing an aromatic group), as presently claimed, provides unexpectedly good retention and dewatering effects. This is confirmed by the examples of the present invention. In that regard, the examples of the present invention show that at higher conductivities, i.e, 2.4 and 2.5 (ex. 7 and ex. 8) and 5.5-10mS/cm (ex. 3) the combination of anionic microparticle material and aromatic cationic polymer shows both better retention and dewatering effect.

In the Examples, two cationic organic polymers have been compared. P1 is a cationic copolymer prepared from 90 mole% acrylamide and 10 mole% acryloxyethyldimethyl benzyl ammonium chloride, and P2 is a copolymer prepared from 90 mole% acrylamide and 10 mole% acryloxyethyltrimethylammonium chloride. These polymers were used together with anionic microparticulate material (silica-based particles) as drainage and retention aids.

In Example 3, drainage and retention performance was determined at three different conductivities; 5.5, 7.0 and 10.0 mS/cm. The drainage and retention aids comprising P1, the polymer with an aromatic group, provided the best results in terms of

both drainage and retention at all three conductivities. For instance, in test 1, using a cellulosic suspension with a conductivity of 5.5 mS/cm and addition of polymer of 2.0 kg/ton dry pulp, the combination of P1 and anionic microparticulate material showed a dewatering time of 14.2 seconds and turbidity of 42 NTU. However, drainage and retention aids comprising P2, the polymer with no aromatic group, together with an anionic microparticulate material showed a dewatering time of 19.2 seconds and turbidity of 64 NTU. The results from test 1 show that the drainage and retention aids comprising cationic organic polymer having an aromatic group, P1, reduced the dewatering time by 26% and the turbidity by 34% compared to when using drainage and retention aids comprising P2, the polymer without the aromatic group.

In test 10, drainage and retention aids comprising polymers P1 or P2 were added in the same amount as in test 2 to a cellulosic suspension having a conductivity of 10.0 mS/cm together with a silica sol (SiO_2 dosage of 1 kg/ton dry pulp). The dewatering time for P1 + anionic microparticulate material was 11.7 seconds and the turbidity was 39 NTU. For P2 + anionic microparticulate material, the dewatering time was 23.3 seconds and the turbidity was 52 NTU. The results from test 10 show that the drainage and retention aids comprising cationic organic polymer having an aromatic group, P1, reduces the dewatering time by 50% and the turbidity by 25% compared to when using the drainage and retention aids comprising P2, the polymer with no aromatic group.

The Examples performed for comparison, Examples 1 and 2, were made with cellulosic suspensions having conductivities of 0.47 and 1.375 mS/cm, respectively. In Example 2, both drainage and retention performance was determined. For instance, in test 3, to a cellulosic suspension having a conductivity of 1.375mS/cm, the polymer was added in an amount of 1 kg/ton dry pulp and the silica sol (anionic microparticulate material) in an amount of 2 kg SiO_2 /ton dry pulp. From Table 2 it can be seen that the drainage and retention aids comprising P1, the cationic polymer having an aromatic group, showed a dewatering time of 21.2 seconds and turbidity of 66 NTU. The drainage and retention aids comprising P2, the polymer without an aromatic group, showed a dewatering time of 18.6 seconds and turbidity of 57 NTU. Accordingly, at

conductivities below the claimed range, the drainage and retention aids comprising anionic microparticulate material and cationic organic polymer having no aromatic group, P2, showed better results in terms of both dewatering and retention compared to when using the drainage and retention aids comprising anionic microparticulate material and P1, the polymer having an aromatic group.

The Examples demonstrate that at low conductivities, the drainage and retention aids comprising anionic microparticulate material and cationic organic polymer without an aromatic group, P2, showed the best results in terms of both drainage and retention. At conductivities within the claimed range, the results obtained were the opposite, the best drainage and retention performance was achieved using the drainage and retention aids comprising anionic microparticulate material and a cationic organic polymer having an aromatic group, P1.

Applicants respectfully submit that there is nothing in the prior art showing that one of ordinary skill in the art would be able to foresee the improvement in drainage and retention that results from using the drainage and retention aid according to the present claims. Applicants submit that only applicant's disclosure provides any motivation for combining the isolated disclosures of the cited references in the manner combined in the Office Action.

Therefore, Applicants respectfully request the rejection of claims 1-4, 6-13, 15, 21-27, 29-31 and 49-57 under 35 U.S.C. 103(a) as being unpatentable over Langley et al., in view of Ogawa et al., further evidenced by Satterfield et al. or Blanco et al., be withdrawn.

IV. <u>Conclusion</u>:

Applicants respectfully submit that the application, including claims 1-4, 6-13, 15, 21-27, 29-31 and 49-57, is in proper form for allowance, which action is earnestly solicited. If resolution of any remaining issue is required prior to allowance of the

application, it is respectfully requested that the Examiner contact Applicants' undersigned attorney at the telephone number provided below.

Respectfully submitted,

Robert C. Morriss
Reg. No. 42,910
Attorney for Applicants

Akzo Nobel Inc.
Intellectual Property Dept.
120 White Plains Road, Suite 300
Tarrytown, New York 10591
(914) 333-7450